

UNIT 7

LINEAR EQUATIONS

Day 1

Solving Linear Equations

A LINEAR EQUATION is an equation in which the highest degree in a simplified form is 1. To solve a linear equation isolate the variable. A linear equation's graph would look like a line - hence the name linear.

## Types of linear equations:

### IDENTITY EQUATION:

Is true for all values of the variable.

Ex: ①  $3x + 2 = 3x + 2$

②  $5 = 5$

$2(x-5) = 5x - 10 - 3x$

③  $2x - 10 = 2x - 10$

## CONDITIONAL EQUATION:

Is FALSE for at least one value of the variable.

Ex: ①  $5x - 1 = 8$   
②  $a = 3$   
③  $2(x-5) = 9$

$$\begin{aligned} 5x - 1 &= 8 \\ 5x &= 9 \\ x &= \frac{9}{5} \end{aligned}$$

## CONTRADICTION EQUATION:

Is FALSE for all values of the variable.

$$\text{Ex: } \textcircled{1} 5x - 3 = 5x + 1$$

$$\textcircled{2} 7 \neq 3$$

$$\cancel{5}x - 3 = \cancel{5}x + 1$$

$$\begin{array}{c} -3 \neq 1 \\ \emptyset \end{array}$$

Equations that are equivalent have the same solution set:

examples:

$$6x + 2 = 14$$

$$x = 2$$

$$-4x - 9 = -17$$

$$x = 2$$

Therefore:  $6x + 2 = 14$  and  $-4x - 9 = -17$  are "equivalent"

1) Determine if the equations are equivalent

$$3x+1=7$$

$$3x=6$$

$$x=2$$

$$2(5x-7)=6$$

$$10x-14=6$$

$$10x=20$$

$$x=2$$

$$\begin{array}{r} \cancel{2}(5x-7)=6 \\ \hline \cancel{2} \qquad \qquad \cancel{2} \\ 5x-7=3 \end{array}$$

2) Solve this linear rational equation

$$\frac{2}{x+3} = \frac{-5}{2x-1}$$

$$2(2x-1) = -5(x+3)$$

$$4x-2 = -5x-15$$

$$9x-2 = -15$$

$$9x = -13$$

$$x = -13/9$$

Restrictions:

$$x+3 \neq 0$$

$$x \neq -3$$

$$2x-1 \neq 0$$

$$2x \neq 1$$

$$x \neq \frac{1}{2}$$

$$/ \quad \{ \}$$

$$\{x \mid x \neq -3, x \neq \frac{1}{2}\}$$



$$3) 3(x-1) \left( \frac{3x-1}{3} - \frac{2x}{x-1} = x \right)$$

Restrictions:

$$x-1 \neq 0$$

$$x \neq 1$$

$$(x-1)(3x-1) - 2x(3) = 3x(x-1)$$

$$\cancel{3x^2} - 4x + 1 - 6x = \cancel{3x^2} - 3x$$

$$-10x + 1 = -3x$$

$$1 = 7x$$

$$\frac{1}{7} = x$$

HOMEWORK:

WORKSHEET 1: 2 - 50 (even) SKIP 18!